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Manufacturing Engineering Laboratory Information Technology Improvement Plan

NISTIR 6378

Status Report

Mark E. Luce
Raymond M. Hoffmann

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards and Technology
Manufacturing Engineering Laboratory
Office of Manufacturing Programs
Gaithersburg, MD 20899

August 1999

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William M. Daley, Secretary

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Cheryl L. Shavers, Under Secretary for Technology

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Office of Manufacturing Programs

The MEL Office of Manufacturing Programs (OMP) is the organizational unit within MEL that is responsible for administering and managing the tasks, milestones and deliverables defined in the MEL Information Technology Improvement Plan. The Manufacturing Engineering Laboratory Systems Administrators, (MELSA) is an OMP group that provides support services for the physical network, central file servers, desktop computing systems, client-server computing systems, computing testbeds and enterprise software applications for all administrative and scientific staff within the MEL. MELSA is also responsible for administering the MEL computing security policy which is designed to ensure that authorized persons have timely and appropriate access to MEL computing resources while maintaining availability, integrity, and reliability of computing resources.

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Overview

In order to improve the stability and efficiency of information and networking systems used throughout MEL, a Lab-wide Information Technology Improvement Plan was developed in 1997 by a team of technical and managerial staff from MEL. The plan was initiated to address the numerous recommendations and problems compiled from an internal assessment project completed in 1996 by members of division support staff. Some of the problems identified by the assessment project included:

- fragmented network information services, multiple network configurations, multiple Internet Protocol domains, and outdated network cabling;
- multiple versions of operating systems on the same computer platform, no standard Lab-wide administrative computing platform and applications,
- limited ability to share data, email and files between MEL staff,
- software licenses not shared between divisions, and security levels of information systems from outside threats not consistent throughout Laboratory, and
- costs for computing support services is increasing throughout the Laboratory.

In order to address these and other problems identified by MEL staff, the Information Technology Improvement Plan was divided into four major tasks, 1. Standardization of Administrative Computing Systems, 2. Upgrading MEL Network, 3. Centralizing Support Services, and 4. Creating Central Information Services. A work breakdown structure that includes task descriptions, deliverables and completion dates for all four major tasks covering a two year time frame was presented to the MEL Management Council (MC) in 1997. The two-year plan along with a support budget covering the two-year effort was reviewed and approved by all members of the MEL MC in May 1997. The plan was initiated in January 1998, with the implementation of the Manufacturing Engineering Laboratory Systems Administration (MELSA) group within the MEL Office of Manufacturing Programs (OMP). The new group was chartered by the MEL MC to provide the following support services to all MEL Division and offices;

1. Support all networked Personal Computers used by MEL administrative, management, and scientific staff for exchanging administrative data, sending email, managing projects, developing reports, creating financial material, and developing presentations within the MEL,
2. Support all central file servers that manage IP addresses, web pages, and contain administrative software applications used by all MEL staff,
3. Support the physical network used by all MEL staff in buildings across the NIST campus, and
4. Support the scientific computing and video systems contained within the NAMT facility

To provide the reader a view of the types of IT systems covered under this Plan, a "MEL IT Systems Map" is included as Appendix B. This systems map includes all of what MELSA is responsible for administering, including the different vendor platforms, the differentiation between server and desktop systems, and encompasses a logical view of how these systems are interconnected by the MEL network (MELnet).

In order to assess the benefits and impacts of implementing this plan across MEL divisions and offices, periodic progress reviews are provided by OMP Management. These progress reviews are used by the MEL MC to determine the long-term strategic directions of this new central support group, and help assess the overall computer and networking support needs of MEL. This report represents status information on the progress of implementing the new central support service group, the Manufacturing Engineering Laboratory Systems Administrators (MELSA), and the major tasks defined in the work breakdown structure covering tasks from January 1998 through March 1999.

Central Support Services Group

The central support group MELSA, has assumed the support responsibilities for all administrative and scientific computing and networking resources within MEL, including the computer systems of the NAMT. The Group is administering Lab-wide guidelines and PC standards, providing support services for administrative and scientific PC based applications, implementing hardware and software upgrades, supporting all networked servers, and managing the upgrade of the MEL network. A summary of the group support services along with a status report on each of the support functions is as follows.

1. **PC's and Server Support** -- The MELSA support group is responsible for ensuring the effective and efficient operation of all 300+ PC computing systems used for administrative and scientific operations within MEL. This includes upgrading all PC's to a uniform secure and reliable operating system, implementing and supporting upgrades to all standard software applications, (email, wordprocessor, web browser, etc.) and hardware upgrades required to support the standard operating system. Support services also include a web-based help desk to ensure staff help requests are addressed in a timely manner. The group also administers the acquisition and upgrade process for all 300+ PC computing systems in order to ensure quick turn-around time of hardware upgrades.

   STATUS REPORT
   The appointment of a Group Leader to manage the central support service operations was made in October of 1997, and full-fledged operation of the MELSA support Group began January 1, 1998. A process for supporting all MEL administrative personal computers was established by November 1997. From January 1998 through January 1999, OMP management conducted numerous meetings with each Division management team to present details of the IT Plan, discuss concerns about level and type of support and plan all necessary upgrades to PC platforms and client server environments. A recommended baseline PC configurations for both desktop and portable systems, with emphasis on the need for compatibility with Windows NT was defined and distributed to each division. In addition, we prescribed verification against the Microsoft certification web page to ensure that PCs and PC-related components have been certified by Microsoft to be NT compatible. This avoided the purchase of PC computers and components that will not work compatibly with Windows NT.

By February 1999, MELSA evaluated near 250 Lab PCs regarding the appropriateness of migrating them to Windows NT. MELSA offered recommendations to all Divisions that resulted in the replacement of approximately 50 PCs, with models more suitable to hold Windows NT. In turn, MELSA provided a procurement mechanism to purchase the new PCs, thereby saving the clients and Procurement the administrative hours that would have been devoted to lengthy procurement cycles.

On the PC platforms, there were not only four different operating systems being used but there were differing levels of each of those operating systems ... which would have made it cost prohibitive to maintain expertise and support on all of them. It has been confirmed that there are PCs whose applications are rooted in DOS. Yet to be determined is which of those applications can and should be rewritten under a more state-of-the-art operating system. As a side note, MELSA is also assisting in determining which of those applications will be Y2K compliant.

APTD Support

In January 1998, MELSA was tasked with immediately taking over the systems administration needs of APTD. Faced with the barriers of a physically dilapidated physical network, an antiquated server design, no network documentation, no support logs, and no indications of the size of the workload, MELSA assumed said systems administration with minimal role-off in levels of support. MELSA has steadily gained the confidence of its APTD clients, and received approval and funding from the APTD management team for re-design of the APTD server and network architecture, which included a successful deviance from the copper wire-based network being installed throughout the MEL to one that is fiber-based.

A project plan was developed for APTD that encompassed surveying the approximate 60 PCs in the Division. The survey concluded with recommending the replacement of 20 PC's, upgrading 6 PC's to save replacement costs, and replacing the Novell server architecture with Windows NT server architecture. All recommendations were completed by January 1999. Also, due to the incompatibility and poor condition of the Sound building network, a separate Windows NT domain from the MELNT domain was established. In turn, it will have a Windows NT workgroup workstation for the Force Group coupled to the NT Sound domain, in a trust relationship that will restrict access to just the Force Group.

MELSA has been successful in continuing to support the scientific computer systems used in MSID, including approximately 70 Suns, 15 SGIs, and the approximate 15 Suns, SGIs, and PCs in the AMSANT.

There are now 17 Unix servers maintained by MELSA, in addition, MELSA sized and installed six Windows NT servers, that handle primarily NT administration but, to date, handle little or no Windows NT applications for administrative or scientific work. It is anticipated that will change in concert with the increases in NT market share as related to manufacturing applications. As requirements for NT-native applications are collected, some or all of the Windows NT servers might have to be increased in computing power.

MEL has adopted Microsoft Office 95/97 for the sharing of word-processing, spreadsheet, database, presentation graphic, and project management files. All of the Office 97 systems that MELSA has installed had their default save settings set for Office 95 to facilitate sharing of files between Office 95 and 97 clients ... until all PC users are on Office 97. There have been some situations where clients have wanted the features of Office 97, for files they were not going to be sharing, and they reset their defaults to Office 97. There have been some instances where file compatibility problems have arisen but not at disruptive levels. Nearly 200 workstations have been migrated to Windows NT.

The Unix systems administration work is now performed by any of the three Unix System Administrators in MELSA and, at times, needs the support of our MELSA network engineer. This sharing of Unix and network systems administration across multiple system administrators has produced quicker and improved results and also offers redundancy in the knowledge chain for this critical Lab facility.

Enterprise Server

The Unix enterprise server has been purchased, tested and installed. Two items have extensively delayed its final rollout:

- *The Sun Systems Corporation delivered over 4-months late the level of operating software that is required for operation of this enterprise-class server over an ATM-based network. As it was, MELSA negotiated a much lower additional cost for this software, attributing the price increase to an error made on the part of the Sun Systems Corporation salesman.*

- *The local Sun Systems Corporation system analysts, provided to NIST under the terms of the purchase cost, were unable to configure the disk architecture in accordance with MEL's unique needs. MELSA Unix system administrators, after attending Unix training negotiated at no cost to MEL, successfully designed the disk architecture and received certification from the Sun Corporation.*

The Unix enterprise server, which is also a High-AvaiLability (HA) class machine, has been operational since February 1, as officially accepted by the Sun Corporation. This acceptance is a critical contractural factor in that this server has failover features which contribute to its HA classification. Migration of all MEL users and applications is being done with a multi-phase approach:

- *The MEL upgrade to the ATM-based network needs to be completed, which is slated for May 31, 1999. This will provide connectivity for all MEL clients to the enterprise server.*

- *Pilot testing and load testing have been completed over the last 3-months, including the ability of the server to fail over to alternative processors, memory, and disk arrays whenever any of those fail, as well as compatible operation with the ATM-based network. The network testing uncovered a software bug in the ATM-based components, which the network vendor resolved at their cost.*

- *An implementation design change was recently made, whereby all applications that are being ported to this machine need to have a program written for them that enables each application to avail itself of the failover capabilities of the enterprise server. Previously all applications were going to be ported over in their native state and converted into failover applications after the server went into production status. Testing proved that was a jeopardous route to take on behalf of the users of the server. Examples of applications are e-mail, calendaring, design, modeling, etc. Each of those needs what is being referred to as a failover program written for them ... with said programs being written by MELSA staff.*

- *It is anticipated that all users, all programs, and all applications that are designed to be operational on the Unix enterprise server will be so by August 1. Delays in this area have been created due to shortage of Unix systems administrator staff.*

Help Request System

Pursuit of installing a commercial off-the-shelf help request system has been abandoned. The vendor proved to be unacceptably unresponsive to our demands. Investigation of the purchased software uncovered that its design was overly complex and would have been difficult to support internally and the vendor showed little or no signs of improvement in their support structure. Pursuit of competing, web-based help request systems has been added to the MELSA task list, but with a medium priority because MELSA's clients have an operational web-based help request mechanism at their disposal. What is lacking is on MELSA's end of the help queue process, i.e., a good set of management tools to document trends and easily accessible log files for each piece of computer equipment supported.

Help Requests

The total number of help requests fielded by MELSA in CY 1998 was 6,119 requests. Of that total, 2,879 were formally submitted through the existing problem management system in these proportions:

Total Level 1 help requests: 664
Total Level 2 help requests: 928
Total Level 3 help requests: 731

MELSA is funded at a level to provide target levels of response. The present target levels of response are Level 1 = 1 day, Level 2 = 1 week, and Level 3 = 1 month, or whenever designated by the client. Due to process improvements, on average, MELSA has been very close in hitting the targets for all Levels in the last three months of operation. The remainder of the formally received help requests (556) were for the blockage of spam that MELSA clients were receiving.

In addition there was an average of 270 telephone calls for help requests received per month, totaling 3, 240 for CY1998.

MELSA supports three MEL networks, 17 Unix servers, eight Windows NT servers, 86 Sun workstations, 24 SGI workstations, 219 PCs, and four Macintosh computers.

Support Contractor
The previous support contractor for PC systems administration in MSID was retained and is now providing support services for all PC's administered by MELSA. A near complete turnover in project management and technical staff was initiated over the past year under the direction of the MELSA Group Leader. The contracting firm has agreed to have their staff comply with the NIST Performance Plan and Appraisal process ... such that the contractor staff are held to the same performance standards as the Federal staff.

2. **NAMT Hardware & Software support** -- The MELSA group provides centralized support of IT resources shared between MEL divisions as part of the NAMT facility. This includes all Unix servers, Sun's, SGI's, PC's, and audio video equipment, the ATM infrastructure supporting the testbed, the scientific software applications, and client-server environment. Additional responsibilities include administering guidelines and procedures for using and allocating the testbed facilities, supporting demonstrations, seminars, workshops, and training events. Support services also include providing a central repository of scientific software applications with network and/or site licenses within the NAMT, in order to reduce redundant purchases and attendant support efforts across Divisions and, at the same time, increase availability of software Lab-wide.

STATUS REPORT
MELSA has given high priority to ensuring the availability of the NAMT systems, including during a period when many new NAMT projects and associated users have been initiated. MELSA is also supporting the non-MEL NAMT project members with their desktop requirements, configuration, and setup. All NAMT computing systems and supporting hardware have been successfully maintained at or above levels expected by the testbed users.

Software Licenses
MELSA is conducting an investigation of all software applications installed on MEL systems. This investigation is to scope out those applications which may be centrally administered, whether on PCs, Suns, SGIs, or Macintosh computers, to enable cost savings and accessibility by MEL's computer Laboratories, AMSANT and the NAMT. The investigation encompasses licensing, platform/operating system performance recommendations, installation methods, configuration control, and maintenance contracts.

The first of hundreds of software applications that was investigated in FY99 is the Parametric Technologies Pro/Engineer application suite of software modules. This is a complex suite of software requiring a goodly amount of configuration management associated with the large number of different modules and "build" configurations. MELSA gathered current licensing information for MSID, ISD, PED and ITL purchased Pro/E modules, maintenance contract information for all the modules, new software packaging and pricing, and performance analysis of various platforms and operating systems. MELSA surveyed the MEL staff and NAMT staff to determine if there is interest in purchasing additional licenses to be shared by MEL staff.

3. **Network Support** -- This area includes managing and supporting the physical cable plant and networking technologies presently providing reliable networking communications to all MEL divisions. Although the Lab has been installing advanced computing systems and has been networking offices through an extended local and wide area network over the past several years, the rapid growth of MEL scientific programs is requiring a higher capacity network. This rapid growth calls for investing in a new networking scheme and for pursuing joint support for upgrading the network with the Information Technology Laboratory (ITL) and other NIST Operating Units (OU).

   STATUS REPORT
   The upgrade of the MEL network actually incorporates a complete replacement of all hardware and software components that previously existed. The entire effort was broken in 7 phases including design, cabling contract procurement, building re-wiring, switch procurement, switch installation/configuration, pilot test, and full deployment.

   The design and procurement phases were completed in FY98. To date, the building re-wiring phase is complete in 202, 304, and 220. Building 233 is 70% complete. Pilot tests began in October 1998 and there are approximately 60 users in buildings 202 and 304 running on the new equipment with great success.

   The cabling work in 220 was completed March 1999, and since that time we have installed the redundant power management system in the 220 wiring closet which consists of 10 large UPS systems and intelligent power modules that allow remote power cycling. The ATM backbone switch and 1 of the 7 Ethernet switches were installed last week in 220. A few users were connected for testing and the results showed a significant increase in performance over the current network.

   Full deployment in 220 will begin in late April 1999. A connection inventory was taken several weeks ago and there are about 350 devices to connect which should take 4 to 6 weeks. By the time deployment is complete in 220, the building re-wire should be complete in 233. Deployment in 233 should take 3 to 4 weeks. Building 225 will be deployed last and will take 1 week. Taking all this into consideration, the MEL network upgrade should be complete in 9 to 12 weeks, or approximately by July 1, 1999.

Group Support Service Funding

The MELSA central support group operates completely on a reimbursable basis, including staff Labor costs, contractor staff Labor costs, and other object costs. A flexible reimbursable budgeting algorithm was implemented to support the yearly Labor and other object costs for MELSA. The budget algorithm is designed to support both fundamental Lab-wide service items such as networking and server support, and flexible service items such as the number of PC and Unix workstations in a division. The budgeting algorithm is designed to have Lab-wide support costs funded in part by all divisions and offices within MEL. Actual costs per division and offices vary depending upon the number and type of users, and number of computer workstations within a

division or office. Yearly and quarterly estimates of support cost for each MEL division and office are provided by OMP management.

The support budget is divided into six service/cost items. (see services and definition example below) Yearly Labor estimates for each service item are calculated based on meeting all division and office needs for best effort full support of each service item. MELSA Labor requirements to support a minimum service level for each service item are defined and approved at the beginning of the fiscal year. A charging algorithm based on the number of MEL users and number of workstations supported by the central support group is used on each service cost item to defray costs across divisions and offices. The following is a list of the six major service cost items used to estimate yearly Labor needs of MELSA.

Service Cost Items and Definition

1. ***Servers*** *- MEL enterprise servers (Unix & NT), mail and firewall servers.*
2. ***Network*** *- Physical cable and router maintenance and upgrade implementation*
3. ***NAMT*** *- Lab equipment support (Computers, AV, etc) maintenance*
4. ***Sun/Unix*** *- Desktop computing support, hardware and software maintenance*
5. ***PC's*** *– Desktop computing support, hardware and software maintenance*
6. ***Mac's*** *- Desktop computing support, hardware and software maintenance*

A one time cost to upgrade both the hardware and software for all 300+ PC's within MEL to support the Windows NT migration plan was required as part of FY98 service costs. As MELSA became more proficient in the survey of requirements, in developing a standard process for loading Windows NT, and in actual implementation, the one-time upgrade charge of $2,100 per PC was dropped. MELSA is now in a position of simply taking on the support of 'x' amount of PCs and quickly configuring those PCs for Windows NT operation and adding that PC to the fully-supported chargeback list.

The software cost of the NT Migration plan included all software licenses, Labor to install and upgrade the PC, and 2-4 hours of NT training per user. These costs are a function of individual division needs, and are based on upgrade requirements defined by each division and office.

STATUS REPORT

MELSA operates completely on a reimbursable basis, including Federal staff Labor costs, contractor staff Labor costs, and Other Objects. These costs total approximately between $350K to $400K per quarter. To defray those costs a distribution schema based on a Rand Distribution Algorithm is used to appropriate costs across all MEL Divisions and Offices. A detailed description of the charging algorithm was presented to the Management Council and approved on July 29th, 1998. The chart below summarizes the estimated and actual costs to date for both Labor and other object charges for the new central support group. The Management Council gave approval in October of 1997 for the formation of the MEL Systems Administration Group, and MELSA formally started operation on January 1, 1998. The MEL Lab Office provided initial funding (*) to establish the new central support group (MELSA) and cover all 2nd quarter support

charges for each division and office. The actual costs included charges from 11/10/97 through 3/31/98.

MELSA Support Charges	*FY98 Estimates*	*FY98 Actual*	*FY99 Estimates*	*FY99 Actual*
1st Quarter	*N/A*	*N/A*	*$400K*	*$313K*
2nd Quarter	*$534K**	*$534K**	*$400K*	*$528K*
3rd Quarter	*$400K*	*$403K*	*$400K*	
4th Quarter	*$400K*	*$365K*	*$400K*	
Totals	*$1.3M*	*$1.3M*	*$1.6M*	

A detailed description of the reimbursable charging algorithm can be found in Appendix A.

Benefits Achieved

The implementation of the Information Technology Improvement plan has resulted in improvements to services for administrative and scientific systems throughput the Laboratory. These improvements include increased user satisfaction of Lab-wide support services, better coordination of Lab-wide Information Technology issues, successful administration of contract services for PC based systems, and upgrades to both the MEL network and client-server environments. A brief summary of the some of the benefits achieved to date is as follows:

- **Network infrastructure:**
  The networking infrastructure in MEL has recently undergone significant change. In the past, MEL achieved network connectivity through a variety of means. In 220, PED, ISD, and MSID had separate, shared 10Mbps Ethernet segments that each connected to the NIST shared 100Mbps FDDI backbone. In 202, ISD shared an Ethernet segment with EEEL that connected to the NIST backbone. APTD operated a single Ethernet segment that spanned buildings 233, 202, 304, and 220 using fiberoptic repeaters. In 304, all MEL divisions shared a single Ethernet segment. Adding the bandwidth of these segments together gave MEL roughly 80Mbps of aggregate bandwidth. MEL was also using the NIST backbone to move traffic between divisions.

  The new MEL network takes a radically different approach. To accommodate the simultaneous transmission of voice, video, and data, the new network is constructed with a high-speed ATM backbone with an aggregate Bandwidth of 25Gbps. New Ethernet switches connect users with dedicated 10Mbps Ethernet links. Using virtual LAN technology each MEL division is mapped into a separate virtual LAN that can span across buildings. This allows workstations to be moved without having to

change configurations. All intra-MEL traffic now stays within the network backbone. The network backbone has a single 100Mbps FDDI connection to the NIST campus backbone to provide a path to the Internet. The network backbone also connects to Internet2 for higher-speed communications with Universities collaborators.

Network protocols are also being standardized across MEL. In the past, APTD ran the Novell IPX/SPX network protocols for client/server communications. There were also groups of Apple hosts that ran Appletalk protocols over Ethernet. For the most part, MEL is standardizing on TCP/IP to achieve compatibility across the organization and with the Internet.

The development of a new high-speed ATM network infrastructure and standardizing on a new cabling technology using LAN concentrators located in centralized service access points in every building, is increasing the capacity and reliability of the MEL network and improving our ability to maintain the network.

- **Computing Security:**
  The merging of disparate IP domains into a common Lab-wide domain is enhancing network security within the Lab. A common IP domain is being created to allow the implementation of comprehensive security technologies and more efficient coordination of all Lab-wide security issues. The enhancing of our physical network is increasing the ability to monitor the network and thus the efficiency and security of all computing systems within the MEL.

  MELSA is taking a very pro-active approach to computer security. Due to the escalation of computer viruses, we have installed Norton anti-virus software on a MEL's Windows NT server specifically earmarked to capture viruses contained in e-mail attachments. Since installing that server, the statistics are starting to sort out to be:

  - MEL is receiving an average of 35, 000 e-mails per month.
  - An average of 45-50 attachments are quarantined for investigation by the anti-virus software.
  - An average of 10-11 destructive viruses are found per month. That equates to a minimum of 10-11 MEL computer users who avoided having virus damage to their computer's operation.
  - One of the more current viruses captured was written to automatically proliferate to 50 additional e-mail users ... which could have had catastrophic consequences to not only those 50 users but also to the operation of the MEL network.
  - One of the least advertised but most serious damages of some viruses is the effect of data being changed undetected. In the arena of financial data or calibration data, the negative impact would be uncalculatable.

There is another area of computer security that MELSA has taken a pro-active approach and that is e-mail SPAM. Not only can these nuisance e-mails prove to be quite bothersome to users they can cause an embarrassment to NIST. The worse by-product of SPAM is when it is "relayed" through a NIST e-mail server to other sites ... with an e-mail address of @nist.gov. MELSA designed some e-mail rules that greatly restrict the

amount of SPAM received through the MEL e-mail servers. At last, count the anti-SPAM programs were blocking an average of 200 relay SPAM messages per day.

- **Support Costs:**
  The assigning of support service responsibilities to a central group has reduced Laboratory costs by leveraging support expertise across divisions and thus reduced redundant personnel costs across divisions. In 1996, MEL was spending approximately $3M per year on Labor costs to support the various computing platforms, testbeds, software applications, and networking needs of the more than 350 staff throughout the Lab. As of January 1999, the estimated Labor costs to support the new central support group is approximately $1.6M per year. With the exception of one MEL Division, all support responsibilities and associated Labor cost for systems support within MEL is now managed within the MELSA central support group.

  Approximately 50% of the MELSA support costs include support services provided by an independent contractor. We are using a contractor to augment the permanent MEL support staff for tasks associated with maintaining all desktop PCs and NT servers. The use of contract services has reduced Labor costs by ~50% for PC based support, while maintaining an efficient level of support expertise to meet the Lab's growing PC support needs. The use of an independent contractor for PC based support has been very successful, and has allowed management to increase and decrease contractor support staff to tasks on an "as needed" basis. Performance standards and metrics are being established to evaluate the effectiveness of this combination of MEL staff and contracted staff. This will allow MEL management to determine the best mix of permanent and contracted resource assignments to meet optimal cost goals.

- A measurable benefit regarding cost avoidance in the area of IT support services can be depicted as follows:

  Federal Labor costs for 3.5 system administrators = $642K
  Contractor Labor costs for 5 system administrators = $600K

  Fully burdened federal Labor costs = $88/hr
  Fully burdened contractor Labor costs = $60/hr

  For one Division alone the costs associated with federal Labor support costs were reduced by $242K.

Observations and Lessons Learned

The implementation of the MEL IT Improvement Plan is an ongoing exercise of change to traditional methods and procedures that have been in place across the Lab for many years. Traditional methods, i.e., non-centralized provided support, of deploying, upgrading and maintaining IT systems were proving to be too costly and were not maintaining a semblance of IT standards across the Lab. Like any other major change to

traditional methods, the implementation of this IT Improvement project over the past year has not been without it's own challenges ... which have ranged from:

- Power users, who had been accustomed to performing their own systems maintenance, expressed a loss of control over their computer operations. This point revolves around the loss of what is known as 'root privilege where previously many users had systems rights to make any and all changes on theirs and other's computers. To improve the security and maintainability of MEL computer systems, the latter through standardization of system configurations, holders of root privilege have been limited. Three immediate measurable benefits have resulted: (1) Managers have voiced appreciation that their researchers have been better able to concentrate on their assigned tasks, as opposed to maintaining computer systems, (2) the number of help requests generated due to problems attributed to inadvertent user mis-configuration of systems has been reduced, and (3) the security of MEL's computer systems has improved, e.g., the number of virilii passed through insecurely configured workstations has been reduced.

- Purported slow response times to help requests. This issue is anchored to the cost of IT support. If a research scientist immediately responds to a fellow staff member's need for computer assistance that is measured against the one- to two-day response time that MELSA provides. MELSA's Operations Plan outlines target response times. In order for MELSA to provide guaranteed response times it would have to increase the number of systems administrators, thereby increasing costs. MELSA and its clients are finding the corect balance between acceptable response times and acceptable costs.

- MELSA issues a quarterly bill to each of the Divisions and Offices. Such cost accounting brings to the forefront the actual costs for systems support across the Lab. Previously those costs were not measured, i.e., when scientific and research staff were performing systems administration, the time they devoted to such efforts were not tracked by most Divisions, hence there isn't data to compare. In some instances Division personnel simply view MELSA charges at extra costs, over and above what they were previously budgeting for, whereas in reality the estimated IT support costs have been reduced.

- Associated with the systems administration being centralized in the Lab Office, there is sometimes the perception that the customized support needed by some of the Divisions has eroded. Experience has shown that it has taken at least the first year of MELSA's operation to learn of the distinctly different cultures existent in each of the Division's and to adjust our problem resolution processes accordingly. It is sometimes ironic that Division's were found to be working with such non-standard computer hardware and software systems ... that thwarted intra-Division sharing of data. MELSA meets with representatives of each of the Divisions, at least monthly, to work out in business terms how each of their support objectives will be met ... with a focus on standardizing IT practices wherever possible.

- There was resistance to the use of contractor personnel for computer support. Once it was proven that these personnel were not a threat to federal personnel's jobs, this resistance has steadily been abating. Additional steps have been taken to bolster the confidence in the contractor's performance, i.e., the contractors

performance is measured through the same Performance Plan/Appraisal process as federal workers ... therefore are seen as having to work to the same quality performance levels.

This first year experience of centralized IT support has provided the following additional benefits:

- Better communications with Division staff on changes to systems, policies etc.
- Improved task management systems to manage help requests.
- Understanding of staff requirements for system administration privileges.
- Initiating a customer service approach to improve task and customer satisfaction.
- Provision of more appropriate skill mix necessary to effectively meet the research, development, and support resources to keep pace with information technology needs throughout the MEL.
- Development of a highly competent and motivated MEL support staff, organized to more effectively support MEL clients, internal and external.
- Provision of economies of scale in purchasing of hardware, software licenses, and contractor support services.
- Standardization of information technologies implemented throughout MEL, hence easier for MEL-wide transition into 21st century scientific and administrative computing.
- Reduction in overall MEL information technology support costs, through published support plans, support levels, and chargeback process.
- Increase visibility to information technology vendors on the critical needs of an organization numbering over 410 clients.
- Improvements to and balance between both the administrative and scientific needs, resulting in increase staff proficiency on computing systems.

Major Tasks and Work Breakdown Structure

This plan includes four major tasks, 1. Standardization of Administrative Computing Systems 2. Upgrading MEL Network, 3. Centralizing Support Services, and 4. Creating Central Information Services. Below is a description of the major tasks, the work breakdown structure and deliverables for each subtask. A summary of the status on each task within the WBS is also provided below.

1. **Standardization of Administrative Information Technology** – This task encompasses the entire computing environment of the MEL. To achieve

Laboratory wide sharing of administrative data, uniform quality levels of administrative computing support and to incorporate comprehensive security technologies, the disparate Internet Protocol (IP) domains will be incorporated into one common MEL IP domain. This task also includes the upgrade of all computing systems used for administrative and management activities to a uniform PC-based hardware platform and installing a common set of standard administrative applications used on these platforms. The latest version of the Windows NT workstation operating system, the MS Office suite of PC applications, and any software application (Eudora, Synchronize, Netscape, etc.) supporting administrative functions will be installed on the networked PC's. A central repository of software applications will be created with network or site licenses in order to reduce redundant purchases and attendant support efforts. This task builds on the NAMT infrastructure concept by developing a Lab-wide client-server environment to facilitate sharing of Lab-wide administrative information across MEL divisions.

1.1 Develop Lab Wide Administrative Client Server Environment.

These tasks encompass the harmonization of all MEL computer systems into a common MEL wide IP domain. The MELSA system administrators will design and implement the necessary hardware and software client server environment to support a single MEL wide IP domain.

Owner - ***OMP Management***
Results/Deliverables - ***Standardized Hardware & Software and harmonize IP domain within an enterprise server environment.***

1.1.1 Assemble Support Team

This task requires the assembly of a technical support team to design and implement a common computing environment, developing a method for sharing administrative data, and developing the migration plan for administrative computing systems. This team will be responsible for the technical requirements definition, implementation schedule development and hardware/software integration regarding the IP harmonization.

Owner - *OMP Management*
Results/Deliverables - Establish MELSA
Status: Completed 1/98

1.1.2 Develop implementation schedule.

Once the technical team has defined the requirements to be accomplished, a schedule of migrating the MEL to a common IP domain will be established.

Owner - *MELSA*
Results/Deliverables - *IP Harmonization Schedule*
Status: Completed 2/98

1.1.3 Purchase Hardware/Software, Test and Install

The technical team will purchase all hardware and software needed for the IP domain migration, test and install the new equipment and integrate it with the current MEL system configurations.

Owner - *MELSA*
Results/Deliverables - Robust MEL IP domain configuration
Status: Completed 3/98

1.1.4 Migrate disparate Division domains to MEL wide domain

When the team has completed the design, installation and testing of the required hardware and software, all MEL computing systems will be moved to the common domain. This task requires coordination will all technical units affected by this domain integration.

Owner - *MELSA*
Results/Deliverables - *Harmonized MEL computing environment*
Status: In work, testing completed and final implementation scheduled for June 1999.

1.2 Migrate Administrative Systems To Common Hardware

All desktop computing systems used for administrative and management activities will be inventoried and evaluated for use in the new MEL wide client/server environment. A standard desktop configuration will be established, all hardware upgraded to meet this standard, and a common administrative operating system and suite of application software will be installed on these systems.

Owner - *OMP Management*
Results/Deliverables - *All administrative PC's upgraded for NT implementation*
Status: In work, ISD and PED to be completed by June 1999

1.2.1 Design Desktop Configuration Options

A common hardware configuration will be developed for recommended upgrades for administrative computing systems. This standard configuration will be designed to meet the minimum requirements of the administrative software to be installed as well as meet identifiable future needs of administrative users.

Owner – *Contractor Systems Plus*
Results/Deliverables - Specifications for administrative hardware
Status: **Completed 2/98**

1.2.2 Identify Users and Inventory Hardware

All MEL desktop administrative computing systems, users and hardware will be identified to establish scope of migration. All hardware needed for upgrade to the minimum required for the new administrative computing environment will be identified. All hardware currently meeting the minimum requirements will be evaluated for compatibility with the new environment.

Owner - *MELSA*

Results/Deliverables - All administrative computing resources identified
Status: **Completed 2/98**

1.2.3 Purchase required desktop hardware.

Once the minimum requirements are defined and needed hardware is identified, a schedule of acquiring the hardware will be developed. This task includes identifying the purchasing options for each division and identifying priority installations of the hardware.

Owner - *MELSA*
Results/Deliverables - *Hardware purchase schedule*
Status: PED and ISD in work with completion expected June 1999.

1.2.4 Develop migration schedule of HW

A schedule for migrating the hardware to all identified administrative computing desktop systems will be established.

Owner - *Contractor*
Results/Deliverables - *Hardware migration schedule*
Status: Completed 5/98

1.2.5 Install and test HW on all administrative computers

After a purchasing and migration plan is developed, all hardware will be installed for the administrative and management systems.

Owner - *Contractor*
Results/Deliverables - *All administrative computing resources upgraded*
Status: Completed 820, 826 and APTD

1.3 Migrate Administrative Systems To Common Software

All personal computers used for administrative and management activities will be migrated to a standard set of software as the administrative standard in MEL.

Owner - *OMP Management*
Results/Deliverables - *Install software on all administrative computing resources*

1.3.1 Identify software and legacy systems

Survey all hardware and office software used for administrative activities as well as Legacy systems to be incorporated in the administrative desktop configuration of the MEL

Owner - *MELSA*
Results/Deliverables - Inventory of all administrative computing resources
Status: Completed 4/98

1.3.2 Preliminary Design

The preliminary design involves determining the standard desktop operating system and application software. This task also includes developing the functional goals of the systems and the security requirements of this configuration.

Owner - *MELSA & Support Contractor*
Results/Deliverables - *NT Operating System*
Status: Completed 4/98

1.3.3 Engineering

Engineering encompasses design of the standard desktop software suite and operating system. This task also develops the all connectivity requirements and configurations and integration with legacy systems and standard hardware recommended in task 1.2.2

Owner - *MELSA & Support Contractor*
Results/Deliverables - NT Operating System and Office 97
Status: Completed 5/98

1.3.4 Lab-Test

Test functionality and security of new desktop software and operating system.

Owner - *MELSA & Contractor*
Results/Deliverables - Tested and secure desktop client configuration
Status: Completed 2/98

1.3.5 Critical Design Review

Review and critic recommended software configuration.

Owner - *MELSA & Contractor*
Results/Deliverables - *MELSA sign-off of configuration*
Status: Completed 2/98

1.3.6 Install and test SW on selected administrative computers

A selected group of administrative users will be identified to field test the software configuration. The goal is to test and evaluate the systems to ensure that the critical design review output is addressed.

Owner - *MELSA & Contractor*
Results/Deliverables - Operational configuration on test systems
Status: Completed 2/98

1.3.7 Develop migration schedule of SW

A schedule of migrating all identified desktop systems to the new MEL software standard will be developed.

Owner - *MELSA & Contractor*
Results/Deliverables - Schedule of software upgrade for all MEL
Status: Completed 3/98

1.3.8 Install and test SW on remaining administrative computers

Install and test software on remaining administrative and management computing systems.

Owner - *MELSA & Contractor*
Results/Deliverables - *MEL configured with new Software suite & OS*
Status: Completed 820, 826 & APTD, PED and ISD scheduled for FY99

2. Network Enhancement – This task covers investment in the physical networking technologies needed to create a robust and reliable networking environment capable of supporting the Lab's current and future computing applications and communications needs. These needs are associated with administrative and management information systems (MIS) as well as technical computing and scientific modeling applications required by MEL technical projects. The implementation plan calls for pursuing joint development and support with the Information Technology Laboratory (ITL) and other NIST Operating Units (OU). This task includes the development of a MEL budget and investment strategy to fund the network enhancement. A testbed will be established to investigate the options available in hardware and software requirements defined in the conceptual design of the enhanced network. Finally, when all requirements and needs have been defined, the network will be designed, an installation schedule will be developed, and the new cabling, hardware and software will be installed.

Owner - *OMP Management*
Results/Deliverables - *A robust network incorporating the latest technologies*

2.1 Develop Conceptual Design of Network

A conceptual design of the proposed network will be developed to enable all interested parties to review the design to ensure that requirements of all Divisions are met when the development of the network occurs.
Reference: "Centralized Network Cabling Proposal, Rob Densock, July 10, 1996"

Owner - MELSA
Results/Deliverables - Conceptual design proposal for MEL MC
Status: Completed 7/97

2.2. Develop MEL Budget and Investment Strategy

This task involves developing the funding strategy for the installation and maintenance of the network. Management from the highest levels in the MEL will be tasked with the development of budget to enable the technical staff to develop the network. This task involves completing all administrative details to coordinate funding strategies with other NIST OU's and establishing MOU's for developing the physical network with the other OU's. Approximately 450 users in the MEL and 6 buildings will be included in the budget of this task. This approach involves coordinating the network development and funding strategy with all OU's sharing buildings that MEL occupies.

Owner - *OMP Management*
Results/Deliverables - A budget and cost centers identified for purchase of network equipment and Labor installation
Status: Completed 7/97

2.3 Develop Network Test Site

This task involves developing a test site for the proposed network technology to be incorporated into the final logical design of the network. This plan calls

for installing 40 category 5 cabling connections in a small physically central group (Shops) with a heterogeneous set of desktop systems (Sun, SGI, PC and Mac). *($200 per drop)* A central physical networking location will be chosen to house the network connections and Ethernet switches

This objective of this task is to evaluate the conceptual design of a centrally located hub design using Ethernet switches to upload information to the ATM backbone installed for the NAMT testbed. The currently installed 'Fore Systems' Ethernet switch will be tested for capacity loading and other defined requirements. Alternate Ethernet switching technology will be evaluated and tested for effectiveness and adherence to defined technical requirements.

Owner - MELSA
Results/Deliverables - A testbed of cat 5 wiring to test the switching hardware.
Status: Completed 2/98

2.4 Design Network, Develop Installation Schedule, Install Physical Plant
Once the funding strategy and budget are established, and testing of the conceptual design is complete, the final design of the network will be completed. The funding and cooperative arrangements established in task 2.2 will affect the design of the network and must be completed prior to undertaking this task.

When the design of the network is complete, an installation schedule will be developed. This installation schedule will include, but not be limited to, selecting a contractor to install the physical plant, testing the selected Ethernet switches connection from the desktop to the fiber optic backbone and other defined requirements.

The objective of this task is to physically link all staff in the MEL to the new category 5 network.

Owner - MELSA *& ITL*
Results/Deliverables - *An enhanced network for MEL*
Status: In work, installing cable in various MEL occupied bldg.'s, completion scheduled for June 1999

3. Establish Central Support Services Group-- This task focuses upon establishing a central support group to provide support responsibility for all networked PC-based desktop computing resources used by MEL staff for administrative and management purposes. The group would also assume the support of scientific computer systems contained within the NAMT. The implementation plan recommends locating the group within the Office of Manufacturing Programs, staffing the group with NIST and/or contracted staff, and funding the group through a charging algorithm based on the number of users, computing workstations and applications supported across the Lab. The group will assist the Chief of the Office of Manufacturing Programs in annually updating the IT strategy for administrative computing, and, in addition, will document and administer Lab-wide guidelines and standards for administrative computing systems. The group will also manage the physical network, and any network Lab-wide information services. Additional components of this tasks include

developing the staffing requirements and operational methods of the new support group, defining funding methods and budgets for the group, implementing a Lab-wide help request process, and development a information technology refreshment plan.

Owner - ***OMP Management***
Results/Deliverables - ***A new administrative support group, policies and guidelines***

3.1. Develop Staffing Requirements And Operational Goals

This task focuses upon the establishment of the new group within the Office of Manufacturing Programs. All aspects of staffing, funding, and recruiting for the group will be accomplished in the following.

Owner - *OMP Management*
Results/Deliverables Support groups policies and guidelines
Status: Completed 7/97

3.1.1 Develop draft mission and operational goals

A clearly defined mission and detailed operational goals will be developed. When an initial draft is developed, a review process involving MEL management and staff will be conducted to ensure that Divisional requirements are met. Specifically, performance standards, guidelines and metrics will be developed to allow evaluation of the central support group and contractor performance.

Owner - *OMP Management*
Results/Deliverables - *Mission and operational goals*
Status: Completed 10/97

3.1.2 Establish staffing requirements and cross-divisional management plan

This task focuses upon developing the actual structure and staffing of the group. A agreement among MEL Divisions will be developed that details all the staffing of the three primary support responsibilities of 1) NAMT, 2) Administrative Systems, and 3) Network Management. This agreement will also address requirements for cross-divisional management issues that arise during the development of this agreement. This agreement will facilitate coordination of staff across divisions and will improve the effectiveness of the new group.

Owner - *OMP Management*
Results/Deliverables - *Support management plan*
Status: Completed 11/97

3.1.2.1 Develop NAMT testbed management plan, metrics and staffing requirements.

All details of staffing, performance metrics and quality requirements for managing the NAMT testbed will be established and agreed upon by Division Management during the execution of this task.

Owner – OMP Management
Results/Deliverables - *NAMT Support plan*
Status: Completed 11/97

Status: MELSA has given high priority to ensuring the availability of the NAMT systems, including during a period when many new NAMT projects, and associated users have been initiated. Of note is that MELSA is also geared to supporting the non-MEL NAMT project members with their desktop requirements, configuration, and setup. MELSA is now staffed to handle this workload.

3.1.2.2 Develop administrative desktop systems management plan, metrics and staffing requirements.
All details of staffing, performance metrics and quality requirements for managing the administrative desktop systems will be established and agreed upon by Division Management during the execution of this task.

Owner – OMP Management
Results/Deliverables - *Administrative PC support plan*
Status: Completed 11/97

Status: Upon recommendation from MELSA, MEL has adopted Microsoft Office 95/97 for the sharing of word-processing, spreadsheet, database, presentation graphic, and project management files. All of the Office 97 systems that MELSA has installed had their default save settings set for Office 95 to facilitate sharing of files between Office 95 and 97 clients ... until all PC users are on Office 97. There have been some situations where clients have wanted the features of Office 97, for files they were not going to be sharing, and they reset their defaults to Office 97. There have been some instances where file compatibility problems have arisen but not at disruptive levels.

Status: Near 200 workstations have been migrated to Windows NT.

3.1.2.3 Develop Network management plan, metrics and staffing requirements
All details of staffing, performance metrics and quality requirements for managing the physical network will be established and agreed upon by Division Management during the execution of this task.

Owner - *OMP Management*
Results/Deliverables - *Network support plan*
Status: Completed 12/97

3.1.3 Establish funding methods and budget
This task focuses upon developing the charging algorithm that will be used to fund the new Central Support Services Group. All Divisions

will provide the needed FTE allocations determined by the charging algorithm. These FTE allocations will be provided to the needed pool of resources after the staffing requirements and cross divisional management plan are developed in task 3.1.2.

Owner - *OMP Management*
Results/Deliverables - *Group budget and funding algorithm*
Status: Completed 2/98

3.1.4 Complete all required management procedures to create the new support group.

This task focuses upon the actual implementation of the staffing and funding agreements developed in task 3.1. Division AO's and Chiefs will provide needed resources and MOU's to complete the task of developing the central support group.

Owner - *OMP Management*
Results/Deliverables - MEL management & NIST Personnel Office signed off of all procedures and agreements for new support group staffing.
Status: Completed 1/98

3.1.4.1 Hire New Group leader

A new Group Leader will be hired and assigned the responsibility of providing administrative and managerial support for the new group. All required administrative and personnel procedures will be completed for reassigning this group leader during execution of this task.

Owner - *OMP Management*
Results/Deliverables - *Group Leader in place*
Status: Completed 1/98

3.1.4.2 Hire or reassign staff and contractors

The new group leader and Chief of the Office of Management Programs will conduct all recruiting tasks needed to establish the new group.

Owner - *OMP Management*
Results/Deliverables - *Group staff in place*
Status: Completed 2/98

3.2. Publish and communicate IT Guidelines, Policies and Standards

This task involves the publishing of the organizational mission and goals, operating policies, procedures, guidelines and standards defined in task 3.1. This task also involves developing and publishing the support policies and standards for MEL wide use of the NAMT testbed. Finally, this task involves effectively communicating to MEL staff the purpose of the new support group.

Owner - *OMP Management*
Results/Deliverables – *Presentation and support documentation*
Status: Completed 3/98

3.3 Develop Web based help desk.
This task involves developing a Web based help desk system to be used by MEL staff to request support from the new group. This task involves developing the requirements of the new help desk, developing the application, testing and installing the help desk.

Owner - *OMP Management*
Results/Deliverables - *Web based help desk*
Status: Completed 4/98

3.4 Develop Information Technology Refreshment Plan
Included in this task is the initial development of the MEL Information Technology Refreshment Strategy for administrative computing. The central support group will assist the Chief of Office of Manufacturing Programs in surveying management and staff of MEL to develop a comprehensive and inclusive IT strategy.

Owner - *OMP Management*
Results/Deliverables - *1998 MEL Information Technology Refreshment Strategy*
Status: Task delayed due to higher priority tasks

4. Establish Central Information Services Functions and Responsibilities this major task is to define and prioritize user needs, and develop other functions and responsibilities that a central support group would offer the MEL in addition to core responsibilities defined in the first three areas. Some of these functions may include developing common mechanisms and solutions for the storing and retrieving non-technical administrative information used to develop reports and track activities within each division. This includes information for the Program "Blue" Book, submissions to the NIST Guide, the MEL Brochure, poster material, and any other Lab-wide services needed to catalogue, store, and disseminate administrative information common to all Divisions. The initial task defined in this area of the plan is to perform a needs and requirements analysis for central information services. This analysis will be used to define Lab-wide needs, help prioritize the needs, and define options for implementing Lab-wide solutions.

Implementing this area of the plan will provide the opportunity to develop common mechanisms and standards for the storing and retrieval of non-technical administrative information that is developed to report upon and track activities within each Division. The central support group will provide services to catalogue, store or track, and disseminate administrative information common to all Divisions. This information will then be distributed MEL wide or further as needed. A common central repository of information concerning the status of projects and other activities will be created and populated with either actual data or information concerning the location of the required data.

Information in this category includes, but is not limited to; 1) Project Plans and Schedules, 2) MEL Program/Blue book material, 3) MEL submission to the NIST Guide 4) Presentation Slides or other media used in managing the projects, 5) Papers and other technical reports, 6) customer databases, 7) Web Sites and content, 8) Database of MEL

users and PC configurations to manage systems, and 9) Budgetary information required at the Lab-wide level 10) other information identified in a needs and requirements analysis.

Owner - *OMP Management*
Results/Deliverables - *MEL Central Information Service*
Status: Completed 1/98

4.1 Conduct needs and requirements analysis
This task involves conducting a needs and requirements analysis for establishing a central information service for the MEL. Staff and management from MEL will be interviewed to determine what information generated by each Division will be included in a central information repository and how this central information is managed.

Owner - *OMP Management*
Results/Deliverables - *Central Information Service needs and requirements analysis*
Status: Task delayed due to higher priority tasks

4.4 Assign Resources and Develop Coordinating Process
This task requires development of the procedures needed to facilitate the gathering and dissemination of central information. Resources will be identified and assigned the task of developing a coordinating process for gathering information to be housed and or tracked by the central information service.

Owner - *OMP Management*
Results/Deliverables - *Central Information Services operational*
Status: Task presently on hold

5. Provide Continuous Support Services Functions, System upgrades and Improvement as required. This major task includes all ongoing support service functions by MELSA and any systems upgrades and/or improvements to the infrastructure, computer platforms, operating systems and software systems required by MEL staff.

5.1 Infrastructure support and improvements
This task involves providing all required support service functions for the MEL infrastructure, and any necessary improvements and/or upgrades to the overall MEL infrastructure.

Owner - MELSA

Subtasks:
5.1.1 Evaluate Netscape calendar server/client
5.1.2 Investigate alternative help desk system
5.1.3 Investigate solution for maintenance of separate password databases
5.1.4 Investigate Eudora replacement
5.1.5 Complete implementation of universal IDs in MEL
5.1.6 Investigate Email Virus and Check Software

5.2 Sun Platform support and improvements

This task involves providing all required support service functions for the Sun platforms, and any necessary improvements and/or upgrades to the Sun systems supported by MELSA.

Owner - MELSA

Subtasks:

5.2.1 Migrate external services from tribble to dribble
5.2.2 Write and supervise maintenance contract for Pro Engineer software support
5.2.3 Install GNU emacs for all UNIX platforms
5.2.4 CYGNUS: renew support/maintenance contract
5.2.5 CenterLine maintenance contract
5.2.6 Install and configure latest version of the Washington University FTP server on the external server (SPARCcenter 1000 or current server).
5.2.7 Install and configure the RAID software on replacement external server
5.2.8 Install and configure the latest version of Majordomo on the external server SPARCcenter 1000). Also migrate lists to new server.
5.2.9 Install and configure the latest version of Sendmail on all Division UNIX clients
5.2.10 Investigate support for third-party applications under Solaris 2.x and add to project plan.
5.2.11 Plan for re-compiling X11R6.3 utilities and system administration utilities in/depot for Solaris 1, Solaris 2, and IRIX to put on titanic. Also document utilities installed.
5.2.12 Titanic upgrade to Solaris 2.6, Titanic Disksuite 4 upgrade
5.2.13 Document applications in /depot
5.2.14 Update on-line host inventory for division owned machines
5.2.15 Install SPARC Enterprise 3000 from IE order
5.2.16 Order DE Sun equipment
5.2.17 Investigate and implement security for new external server (SPARCserver 1000)

5.3 SGI Platform support and improvements

This task involves providing all required support service functions for the SGI platforms, and any necessary improvements and/or upgrades to the SGI systems supported by MELSA.

Owner - *MELSA*

Subtasks:

5.3.1 Write SGI hardware maintenance contract
5.3.2 Install GNU emacs for all UNIX platforms
5.3.3 Update on-line host inventory for division owned machines
5.3.4 Build latest Cygnus developers kit for IRIX 6.x.

5.4 PC Platform support and improvements

This task involves providing all required support service functions for the PC platforms, and any necessary improvements and/or upgrades to the PC systems supported by MELSA

Owner - MELSA

Subtasks:

5.4.1 Implement automatic backups
5.4.2 Sync MEL anti-virus support with NIST-wide site license
5.4.3 Update MELSA on-line host inventory for division owned machines
5.4.4 Investigate and Evaluate alternative operating system standardization for MEL
5.4.5 Systems Administration supported home and travel PC environment.
5.4.6 Investigate telecommuting alternatives for Division

5.4.7 Renew maintenance contract for Eudora
5.4.8 Complete NT Design Document
5.4.9 Research, evaluate, and recommend products and product write-ups for web pages

5.5 Cross Platform improvements

This task involves providing all required support service functions for any systems and/or software licenses used by MEL on all computer platforms, and any necessary improvements and/or upgrades to the systems and/or software licenses supported by MELSA.

Owner - MELSA

Subtasks:

5.5.1 Write FrameMaker maintenance contract for Sun, Mac and PC licenses
5.5.2 Write Legato maintenance contract for Sun, PC, and SGI client licenses
5.5.3 Investigate participation in all Division's yearly IE review
5.5.4 Install hardware upgrades purchased from MSID FY99 yearly IE

Appendix A

Detailed Description of Reimbursable Charging Algorithm

MELSA operates completely on a reimbursable basis, including Federal staff Labor costs, contractor staff Labor costs, and Other Objects. These costs total approximately between $350K to $400K per quarter. To defray those costs a distribution schema based on a Rand Distribution Algorithm is used. Please reference Figure A (Example MELSA Quarter Cost spreadsheet) when referring to the row-by-row, column-by-column explanation of how the algorithm works.

FIGURE A

		A	B	C	D	E	F	G	H	I	J
1		820	820.03	821	822	823	825	826	**Totals**	**Wgt**	
2		**Lab**	**OMP**	**PED**	**APTD**	**ISD**	**FTD**	**MSID**			
3											
4	**USERS**										
5	FT Users	16	5	45	50	47	45	61	263	1.0	
6	PT Users	2	0	7	1	7	0	5	22	0.5	
7	Split	0	0	0	0	1	0	0	1	0.5	
8	Guests	0	1	16	9	6	0	0	32	1.0	
9	**Wgt Total**	17	6	64.5	59.5	51	45	63.5	306.5		
10									**Cost $**	**$400k**	
11	**Category**										**Wgt**
12	Servers	17	6	64.5	59.5	51	45	63.5	306.5		
13		$4	$2	$16	$15	$13	$11	$16	$77		.25
14	Network	17	6	64.5	59.5	51	45	63.5	306.5		
15		$3	$1	$11	$11	$9	$8	$11	$54		.17
16	NAMT	17	6	64.5	59.5	51	45	63.5	306.5		
17		$2	$1	$7	$7	$6	$5	$7	$34		.11
18	SUN/UNIX	0	0	0	1	0	1	41	43		
19		$0	$0	$0	$1	$0	$1	$39	$41		.23
20	PC	18	9	12	59	9	15	55	177		
21		$7	$4	$5	$24	$4	$6	$22	$72		.23
22	Mac	1	0	0	0	0	0	5	6		
23		$1	$0	$0	$0	$0	$0	$5	$6		.02
24	SGI	0	0	0	0	0	0	12	12		
25	Charge	$0	$0	$0	$0	$0	$0	$28	$28		.09
26											
27	SUM	17.5	6.91	39.79	57.15	31.26	31.4	128.9	313	$313	1.0
28	**Charge**	**$18**	**$7**	**$40**	**$57**	**$31**	**$31**	**$129**			

Row 1 = Organizational code for MEL Divisions and Office

Row 5 = Number of **full-time** users of computing support services, including MEL servers, network, and Sun, PC, Mac, or SGI computing platforms.

Row 6 = Number of **part-time** users of those same support services.

Row 7 = Number of staff members who **split** their time across Divisions and use support services.

Row 8 = Number of guest researchers who use support services.

Rows 5 – 8 Column I = Percentage weight of the total quarterly support cost, per individual. The weight will be either 100% for full-time and guest-researcher staff members or 50% for part-time staff members; part-time defined as staff who work 32 hours per week or less.

Row 10, Column I = Total quarterly support cost, to be defrayed across the Lab organizations.

Row 12 = **Servers**, to include MEL enterprise servers [Unix and NT], mail servers, and the firewall server. There is normally a one-to-one ratio between the number of staff members in row 9 and row 15, per organization. MELSA is collecting costs attributable to the aforementioned servers including Labor for design, configuration, and support, and Other Object costs including vendor maintenance contracts.

Row 12, Column J = Percentage weight assigned to the proportion of the total MELSA Labor and Other Object costs attributable to the **server** category.

Row 13, Columns A - G = Actual proportional cost for the **server** category for each MEL organization.

Row 14 = **Network**, to include Labor and implementation costs for the MEL network upgrade and follow-on maintenance and support. There is normally a one-to-one ratio between the number of staff members in row 9 and row 18, per organization.

Row 14, Column J = Percentage weight assigned to the proportion of the total MELSA Labor and Other Object costs attributable to the **network** category.

Row 15, Columns A - G = The actual proportional cost for the **network** category for each MEL organization.

Row 18 = The **Sun** desktop computing platform includes hardware, operating & application software and maintenance for same.

Row 18, Column J = The percentage weight assigned to the proportion of the total MELSA Labor and Other Object costs attributable to the **Sun** desktop computer category.
Row 22, Column A – G = The actual proportional cost for the **Sun** desktop computer category for each MEL organization.

Row 20 = The **PC** desktop computing platform includes hardware, operating & application software and maintenance for same. Also includes migration to Windows NT.

Row 20, Column J = The percentage weight assigned to the proportion of the total MELSA Labor and Other Object costs attributable to the **PC** desktop computer category.

Row 21, Column A - G = The actual proportional cost for the **PC** desktop computer category for each MEL organization.

Row 22 = The **Macintosh** desktop computing platform includes hardware, operating & application software and maintenance for same.

Row 22, Column J = The weight assigned to the proportion of the total MELSA Labor and Other Object costs attributable to the **Macintosh** desktop computer category.

Row 23, Column A - G = The actual proportional cost for the **Macintosh** desktop computer category for each MEL organization.

Row 24 = The **SGI** desktop computing platform includes hardware, operating & application software and maintenance for same.

Row 24, Column J = The weight assigned to the proportion of the total MELSA Labor and Other Object costs attributable to the **SGI** desktop computer category.

Row 25, Column A - G = The actual proportional cost for the **SGI** desktop computer category for each MEL organization.

Row 28, Column A - G = The actual cost, per MEL organization, for the respective quarter.

NOTES: Normally MELSA will request that the staff counts [the data in Rows 5/6/7/8, Columns C, D, E, F,G, H, I] and machine counts [the data in Rows 21/24/28/31, Columns Columns C, D, E, F, G, H, I] are supplied to the MELSA two weeks prior to the next fiscal quarter.

Regarding PCs, MELSA will provide support for the PCs requested, by machine name, for the upcoming quarter. Support required for any PC not on the list will be provided for a flat rate of 4 hours x the average hourly rate [$55] of the contractor support staff, which equates to $220 for 4 hours. The total charges for these flat rate calls will be included, per Division, in Row 26.

PCs can be added as necessary during the quarter. They will be added to the total count and cost distribution per each Division, except in the case where a PC is replacing an older one; there will not be double charging. For PCs dropped during the quarter, the drop will occur in the following quarterly update of the machine list.

Row 21 Includes charges, not included in the distribution algorithm, per Division ...for work on PCs not requiring full-support, but rather are worked on by MELSA on a 4hr flat-rate basis per incident. These 4hr flat rate costs are borne by the incurring Division. Example: MELSA supports NIST-owned PCs that are normally stationed at home but need support work. Example: MELSA supports portable PC computers that are not used on a daily basis but need support work.

Appendix B

Detailed Description of the MEL IT Systems Map. This systems map includes all of what MELSA is responsible for administering, including the different vendor platforms, the differentiation between server and desktop systems, and encompasses a logical view of how these systems are interconnected by the MEL network (MELnet).